

## PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

**PCT****NOTIFICATION OF ELECTION**  
(PCT Rule 61.2)

To:

Commissioner  
 US Department of Commerce  
 United States Patent and Trademark  
 Office, PCT  
 2011 South Clark Place Room  
 CP2/5C24  
 Arlington, VA 22202  
 ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 23 January 2001 (23.01.01)
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International application No. PCT/US99/30640	Applicant's or agent's file reference 9392-016-228
International filing date (day/month/year) 22 December 1999 (22.12.99)	Priority date (day/month/year) 22 December 1998 (22.12.98)

Applicant KAUFFMAN, Stuart, A. et al
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1. The designated Office is hereby notified of its election made:

in the demand filed with the International Preliminary Examining Authority on:

12 July 2000 (12.07.00)

in a notice effecting later election filed with the International Bureau on:

\_\_\_\_\_

2. The election  was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer  Olivia TEFY
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

## PATENT COOPERATION TREATY

PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

REC'D 20 JUL 2001
WIPO
PCT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 9392-016-228	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US99/30640	International filing date (day/month/year) 22 DECEMBER 1999	Priority date (day/month/year) 22 DECEMBER 1998
International Patent Classification (IPC) or national classification and IPC IPC(7): G06F 17/60 and US Cl.: 705/36		
Applicant BIOS GROUP LP		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets.

This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority. (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 0 sheets.

3. This report contains indications relating to the following items:

- I  Basis of the report
- II  Priority
- III  Non-establishment of report with regard to novelty, inventive step or industrial applicability
- IV  Lack of unity of invention
- V  Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI  Certain documents cited
- VII  Certain defects in the international application
- VIII  Certain observations on the international application

Date of submission of the demand 12 JULY 2000	Date of completion of this report 17 JUNE 2001
Name and mailing address of the IPEA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer VINCENT MILTON <i>James R. Matteson</i> Telephone No. (703) 305-3900

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US99/30640

**I. Basis of the report****1. With regard to the elements of the international application:\*** the international application as originally filed the description:pages 1-86, as originally filed  
pages NONE, filed with the demand  
pages NONE, filed with the letter of \_\_\_\_\_ the claims:pages 87-108, as originally filed  
pages NONE, as amended (together with any statement) under Article 19  
pages NONE, filed with the demand  
pages NONE, filed with the letter of \_\_\_\_\_ the drawings:pages 1-30, as originally filed  
pages NONE, filed with the demand  
pages NONE, filed with the letter of \_\_\_\_\_ the sequence listing part of the  
description: NONE, as originally filed  
pages NONE, filed with the demand  
pages NONE, filed with the letter of \_\_\_\_\_

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item. These elements were available or furnished to this Authority in the following language \_\_\_\_\_ which is:

- the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).  
 the language of publication of the international application (under Rule 48.3(b)).  
 the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international

- contained in the international application in printed form.  
 filed together with the international application in computer readable form.  
 furnished subsequently to this Authority in written form.  
 furnished subsequently to this Authority in computer readable form.  
 The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.  
 The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4.  The amendments have resulted in the cancellation of:

- the description, pages NONE  
 the claims, Nos. NONE  
 the drawings, sheets NONE

5.  This report has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).<sup>11</sup>

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

\*\*Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US99/30640

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. statement**

Novelty (N)	Claims <u>(Please See supplemental sheet)</u>	YES
	Claims <u>(Please See supplemental sheet)</u>	NO
Inventive Step (IS)	Claims <u>(Please See supplemental sheet)</u>	YES
	Claims <u>(Please See supplemental sheet)</u>	NO
Industrial Applicability (IA)	Claims <u>(Please See supplemental sheet)</u>	YES
	Claims <u>(Please See supplemental sheet)</u>	NO

**2. citations and explanations (Rule 70.7)**

Claims 90-93, 96-97 and 99-100 lack novelty under PCT Article 33(2) as being anticipated by Barr et al (US Patent No. 5,761,442).

As per claims 90-93, 96-97 and 99-100, Barr et al discloses a system and method for selecting a portfolio of securities and defining a probability distribution of the value of a portfolio assets with two or more Gaussian distributions. Note the abstract and column 9, line 40 to column 10, line 64.

Claims 1-25, 27-66, 68-73, 75-88 and 90-99 lack(s) industrial applicability as defined by PCT Article 33(4).

The Examiner notes that the disclosed invention is not within the technological arts. The claimed invention is also noted not to be a computer program, data structure, a natural phenomenon, a non-descriptive material per se. The claimed invention does not include a series of steps to be performed by a computer. The claimed invention also is not a product for performing a process, nor is it a specific machine or manufacture. The claimed invention is not a specific tangible machine or process for facilitating a business transaction. Claims 1-24, 27-46, 49-65, 68-72, 75-87, 90-98 do not appear to correspond to a specific machine or manufacture disclosed within the instant specification and thus encompass any product of the class configured in any manner to perform the underlying process. The claimed invention also does not include a post-computer process activity or a pre-computer process activity. Thus, no physical transformation is performed, no practical application in the technological art is found. Consequently, the claims are analyzed based upon the underlying process, and are found to lack industrial applicability.

Claims 25, 47-48, 66, 73, 88, 99 are directed toward a data structure. Data Structures claimed as embodied in computer-readable media are descriptive material per se because they are neither physical "things" nor statutory processes. No defined structural and functional interrelationships with a general purpose computer for permitting the claimed functions to be realized are provided in the specification. The control of these various functions into an overall integrated system (Continued on Supplemental Sheet.)

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US99/30640

**Supplemental Box**

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Boxes I - VIII

Sheet 10

**V. 1. REASONED STATEMENTS:**

The report as to Novelty was positive (YES) with respect to claims 1-89, 94-95 AND 98.

The report as to Novelty was negative (NO) with respect to claims 90-93, 96-97 AND 99-100.

The report as to Inventive Step was positive (YES) with respect to claims 1-89, 94-95 AND 98.

The report as to Inventive Step was negative (NO) with respect to claims 90-93, 96-97 AND 99-100.

The report as to Industrial Applicability was positive (YES) with respect to claims 26, 67, 74 AND 89.

The report as to Industrial Applicability was negative (NO) with respect to claims 1-25, 27-66, 68-73, 75-88 AND 90-100.

**V. 2. REASONED STATEMENTS - CITATIONS AND EXPLANATIONS (Continued):**

requires specialized computer programs and/or associated circuitry. The claims should define structural and functional interrelationships between data structures or functional parts and a computer system which permit the data functions to be realized. Thus, the claims are found to lack industrial applicability.

Claims 26, 67, 74 and 89 meet the criteria set out in PCT Article 33(2)-(4), because the prior art does not teach or fairly suggest:

Determining one or more fitnesses corresponding to the one or more economic models by comparing the plurality of predicted time series to actual data as recited in claims 1 and 26.

A model of a securities market comprising a plurality of dealer agents representing a corresponding plurality of market makers in the securities market each dealer agent having at least one of a plurality of dealer strategies for setting the price of securities as recited in independent claims 27 and 47 and 48

Searching for an optimal portfolio of assets within a defined size range having an upper limit equal to the size of a current portfolio and a lower limit equal to the size of the next portfolio as recited in independent claims 49, 66 and 67.

Searching for optimal ones of a portfolio of assets at optimal distances in a fitness landscape representation over a space of portfolios as recited in independent claims 68, 73 and 74.

The probability functions of claims 94 and 95 and the pricing formula of claim 98.

Determining a plurality of anti-correlated families wherein each of the anti-correlated families contains two or more of the plurality of assets that are anti-correlated as recited in independent claims 88 and 89.

**----- NEW CITATIONS -----**

US 5,761,442 A (BARR ET AL.) 02 JUNE 1998, SEE COLUMNS 1-2.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
29 June 2000 (29.06.2000)

PCT

(10) International Publication Number  
**WO 00/38094 A3**

(51) International Patent Classification<sup>7</sup>: **G06F 17/60**

Fe. NM 87501 (US). ~~MACREADY, William, G. [US/US]; 339 1/2 Delgado, Santa Fe, NM 87501 (US); PALMER, Richard [GB/US]; 4030 Forestdale Drive, Durham, NC 27712 (US); COWAN, Jack [US/US]; 5448 S. Ridgewood Court, Chicago, IL 60615 (US); PEITELBAUM, Dan [US/US]; 618 Old Santa Fe Trail #G, Santa Fe, NM 87501 (US); OUTKIN, Alexander [RU/US]; 1548 Avida de las Americas, Santa Fe, NM 87501 (US); SAWHILL, Bruce, K. [US/US]; 1525 Upper Canyon Road, Santa Fe, NM 87501 (US); MAKHANKOV, Vladimir [RU/US]; 4148 Chaparron Place, Santa Fe, NM 87501 (US).~~

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22 December 1999 (22.12.1999)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/113,502 22 December 1998 (22.12.1998) US  
22 June 01 (30 mos)

(71) Applicant (for all designated States except US): BIOS GROUP LP [US/US]; 317 Paseo de Peralta, Santa Fe, NM 87501 (US).

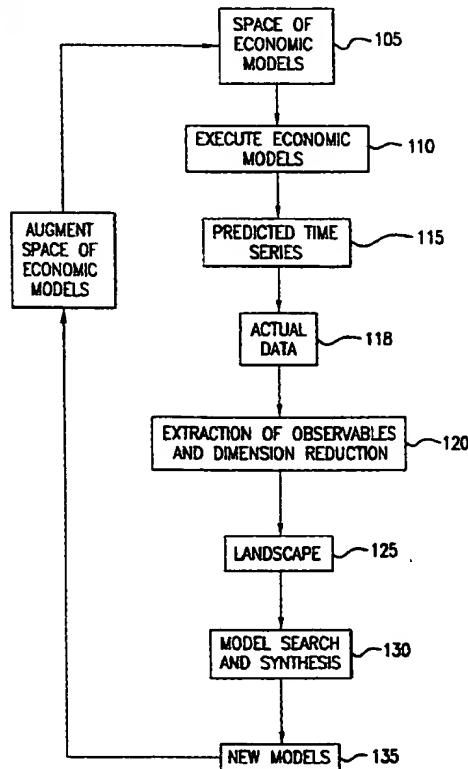
(72) Inventors; and  
(75) Inventors/Applicants (for US only): KAUFFMAN, Stuart, A. [US/US]; 1811 South Camino Cruz Blanca, Santa

(74) Agents: MORRIS, Francis, E. et al.; Pennie & Edmonds LLP, 1155 Avenue of the Americas, New York, NY 10036 (US).

(81) Designated States (national): AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO,

[Continued on next page]

(54) Title: A SYSTEM AND METHOD FOR THE ANALYSIS AND PREDICTION OF ECONOMIC MARKETS



(57) Abstract: The present invention presents a system and method of economic analysis and prediction which dynamically adapts to a changing economic environment by selecting or synthesizing an economic model from a set of economic models based on the selected model's ability to make accurate predictions about an actual economic market. Specifically, the method and system of the present invention forms a space of different economic models (105), forms a behavioral landscape by extracting observables from executions of the economic models (120), and performs model selection and composite model synthesis through optimization (130) over the behavioral landscape.

WO 00/38094 A3



RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG,  
US, UZ, VN, YU, ZA, ZW.

(84) **Designated States (regional):** ARIPO patent (GH, GM,  
KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent  
(AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent  
(AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU,  
MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM,  
GA, GN, GW, ML, MR, NE, SN, TD, TG).

**Published:**

— *With international search report.*

(88) **Date of publication of the international search report:**  
18 January 2001

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US99/30640

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :G06F 17/60

US CL :705/36

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 705/36, 35, 37

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Please See Extra Sheet.

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	ENGLE R.F. "Statistical Models for Financial Volatility", Financial Analysis Journal, January 1993, v49 n1, pages 72-78.	1-26
A	KIM D. et al, "Alternative Models for the Conditional Heteroscedasticity of Stock Returns", Journal of Business, October 1994, v67 n4, page 563.	1-26
A	US 5,630,127 A (MOORE et al) 13 May 1997, see the abstract, col. 30 lines 9-16.	1-26
A	US 5,765,143 A (SHELDON et al) 09 June 1998, see col. 14 lines 61-66.	1-26
A	US 5,799,287 A (DEMBO) 25 August 1998, see the abstract.	1-26

Further documents are listed in the continuation of Box C.  See patent family annex.

-	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
*A*	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
*E*	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
*L*	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
*O*	document referring to an oral disclosure, use, exhibition or other means		
*P*	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search  30 SEPTEMBER 2000	Date of mailing of the international search report  25 OCT 2000
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer  ROBERT A. WEINHARDT <i>James R. Matthews</i> Telephone No. (703) 305-3900

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US99/30640

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A, E	US 6,049,783 A (SEGAL et al) 11 April 2000, see the abstract.	1-26
A, E	US 6,061,662 A (MAKIVIC) 09 May 2000, see the abstract.	1-26

**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/US99/30640

**Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)**

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.: because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3.  Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

Please See Extra Sheet.

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: 1-26

**Remark on Protest**

- The additional search fees were accompanied by the applicant's protest.  
 No protest accompanied the payment of additional search fees.

**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/US99/30640

**B. FIELDS SEARCHED**

Electronic data bases consulted (Name of data base and where practicable terms used):

**STN, DIALOG**

search terms: predict, forecast, model, analyze, stock market, option, equity, bond, security, portfolio, NASDAQ, AMEX, NYSE, gaussian, statistic, time series, arv, arch, garch, black scholes, langevin, levy, select, choose, use, pick, best, fitness, accuracy

**BOX II. OBSERVATIONS WHERE UNITY OF INVENTION WAS LACKING**

This ISA found multiple inventions as follows:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Group I, claim(s) 1-26, drawn to analyzing and predicting the economic markets using a plurality of economic models and generating a time series of them.

Group II, claim(s) 27-48, drawn to analyzing and predicting a securities market wherein the program models dealers, investors and various rules.

Group III, claim(s) 49-67, drawn to creating a portfolio of assets by generating smaller and smaller portfolio of assets to determine and search an optimal portfolio.

Group IV, claim(s) 68-74, drawn to optimizing a portfolio of assets by determining an optimal fitness landscape representation of portfolios.

Group V, claim(s) 75-89, drawn to creating a portfolio of assets utilizing anti-correlated families.

Group VI, claim(s) 90-100, drawn to modeling a portfolio utilizing gaussian statistics.

The inventions listed as Groups I-VI do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: each group is separate and distinct from each other.